

Roadway Safety Audit

IM 29-3(76)78 & P 0042(10)363, Minn. Co.
PCEMS 3443 & 4458

Final Report
May 23, 2002

SAFETY AUDIT TEAM MEMBERS:

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AUDIT DATE:

May 16 and 17, 2002

PROJECT DESCRIPTION:

I 29 at SD 42 Exit 79 & 0.3 miles N of SD 42 Exit 79 over E&E Railroad, Mainline from Skunk Creek to near Russell Street in Sioux Falls, Interchange at Madison Street, & SD 42 from East of Marion Road to **Lyons Blvd. Str. Nos. #50-175-207/210 & 50-176-207.** Interchange Modification, Grading , Replace Structures & CRC on Mainline, and Grading, Structures & PCC Paving for New Interchange

INFORMATION/MATERIALS USED DURING THE AUDIT:

Preliminary project plans and preliminary design meeting minutes,
Traffic accident data,
Traffic volume data,
AASHTO Road Design Manual,
Federal Manual on Uniform Traffic Control Devices,
State of South Dakota Standard Specifications,
Highway Capacity Manual

SAFETY CONCERNS/FINDINGS:

- 1. Access Management on 12th Street - 12th Street corridor is one of the major traffic arterial routes through Sioux Falls. The land area to the north, south and west will continue to develop and increase traffic volumes. Development of high-density residential areas between Marion Road and I-29, from 12th to 18th, will result in approximately 5000 additional vehicles per day traveling north on Ebenezer to 12th Street. **The 5000 additional vehicles is a preliminary estimate provided by the City of Sioux Falls Planning Office.** As a minimum, the current Level of Service needs to be retained and if possible improved. This is necessary to provide for the most safe roadway section and keep accident rates at a minimum. The proposed installation of a center median on 12th Street should be accomplished.**

No median breaks should be allowed except at the signalized intersections at Marion Road, Ebenezer and Lyons Blvd.

If strong resistance to the proposed center median is received from local business owners, the Roadway Safety Audit Team recommends the following **four options are considered:**

- Promote development of street system to access backside of businesses that front 12th Street. Consider east/west streets south and north of 12th street that end in culdesac prior to Marion and I-29. Ebenezer to provide access to these east/west streets.**
- Purchase of the Pine Crest motel, the campground property **to the west of the motel, and the property north of 14th Place between Ebenezer and Ruth.** This will allow the construction of a service road/street south of 12th Street for business access. It will also allow proper reconstruction of the SB on ramp to allow snow storage, **the construction of** a ditch to provide proper drainage, eliminate water run off onto the ramp and eliminate shade conditions to allow sun to help eliminate frozen moisture conditions on the ramp during winter months. Accesses between I-29 and Ebenezer would be right in, right out only.**
- Promote property owners to share accesses between properties. Proposed reconstruction of Ebenezer by the City in 2003 will provide good north/ south access for businesses north of 12th Street.**
- Build the median from I-29 to Ebenezer and allow a two way left turn lane from Ebenezer to Marion with qualifications that the median would be constructed a some defined date in the future to allow the businesses time to work out access issues.**

2. Propose Ebenezer be extended north to Madison or connect to 8th Street to allow access to businesses on the north side of 12th Street during construction and after construction. Ebenezer will allow businesses north of 12th access to make left turns and proceed east on 12th. What would the RR north of 12th require at the crossing for signing or signalization?
3. U-turns at intersections are a safety concern with any vehicles larger than a pickup. A potential exists for safety conflicts between the u-turning vehicle and right turning vehicles from side street.
4. As currently designed, snow removal and snow melt run off on the ramps is a safety concern at 12th Street, particularly at the SB on ramp. Lack of direct sunlight could cause slick ramp conditions for extended lengths of time. One solution is to purchase ROW necessary to properly design the ramp so that a retaining wall is not necessary. Consider ditch to catch snowmelt to avoid sheet flow across the ramps.

Snow removal on 12th Street under I-29 is a concern. The area between retaining wall and 12th Street lanes should provide some snow storage.

The median on 12th Street will require more work to remove the snow. Driveways may be effected due to increased snow removal issues.

There is a potential for slick road conditions to occur on I-29 over 12th. Install sensors to detect temperature, precipitation, etc.

Similar snow removal concerns exist at the Madison Street Interchange and ramps.

Consider the addition of pavement condition sensors at the mainline, ramp and crossroad locations at both the 12th and Madison Street interchanges.

5. Deck drains to be positioned correctly to prevent run off onto pavements.
6. Does 16.5' clearance of I-29 above 12th Street allow for traffic signal heads to be installed at the proper clearances?
7. What does the Railroad require for clearance? Sheet 9, 23' clearance is standard. Railroad has been requesting 23'6" on other projects. Will there be a problem with the 23'?
8. Bridge design requires 0.2% profile grade across structures to prevent black ice conditions. Station 86 to 87 the profile grade is flat in the preliminary plans.
9. Pedestrian crossing on north side of 12th Street. ADA ramps need to be built parallel to 12th Street. Provide truncated domes on the ramps for ADA blind person compliance. See attachments.

10. Extend a median easterly for 100'-150' on 12th Street between EB through traffic and the traffic turning right from NB off ramp.
11. Added lane from I-29 east to Lyons. Check need to extend past Lyons through the intersection. 744' exists from Lyons to river structure.
12. Transit needs? Buses stop in traffic lane and cause delay and traffic weaving problems. Consider bus shelters, benches, ADA access, bus pullouts (150'-200' length) at downstream side of the intersection at 12th Street and Ebenezer for both EB and WB. Check to see if there are similar transit needs on Madison and 12th Street within the limits of the projects.
13. The installation of curb along the Interstate shoulders and ramps should be avoided. Page 844 of the fourth edition of the AASHTO "A Policy on Geometric Design of Highways and Streets" states, "Ramps at interchanges should be designed without curbs. Curbs should only be considered to facilitate particularly difficult drainage situations, such as in urban areas where restrictive right-of-way favors enclosed drainage. In some cases, curbs are used at the ramp terminals but are omitted along the central ramp portions." It is recommended attempts be made to try and change the design of the project accordingly.
14. Check need for temporary traffic signal along Madison for detour of traffic during 12th Street construction.
15. A new project has been proposed in 2004 to add WB to NB right turn lane and a NB/SB lane at 12th and Kiwanis. Should be done concurrently with construction of Madison Interchange. The intersection of 12th and Kiwanis will be on detour route for 12th Street interchange project. Will acquisition of ROW at 12th and Kiwanis delay addition of lanes at 12th and Kiwanis and thereby, be a problem for 12th Street interchange project detour?
16. How will grade line from RR structures south to 12th Street interchange be maintained during construction phasing?
17. Flatten radii for right turns (trucks) at curves on ramps from 12th Street and from Madison to the interstate. Previous projects in the State had radii that are sharp for truck turning movements.
18. Traffic Signal operational issues. There exists a need conduit and fiber interconnect for the length of the project. Programming of the pedestrian movements across several lanes at the interchanges so that it does not interfere with the programming for progression of traffic on 12th Street.

19. **Consider providing the sidewalk** on the north side of 12th Street from Marion to Lyons blvd.
20. What is the design year for storm drainage and where will water go?
21. **Consider maintaining 4-lanes (2 NB/2 SB) on I-29 during winter months while under construction.**
22. The use of pavement markings to eliminate the use of the second left turn lanes on Madison at the interchange is not a good option. Motorists will drive into the marked out lanes when the lane is covered in the winter months with sand, snow, etc. Recommend that the dual left turns be installed and used once the interchange is constructed. This should not be a problem since the signals will operate with the same phasing whether the dual left turns are allowed or not. The dual left turns will initially allow less green time for the left turns thereby decreasing the delay to the through traffic. **(Note that the NB on-ramp length is designed for single left only.)**
23. Sheet 2 of the typical section - can the 3:1 slope be flattened to eliminate the guardrail on the I-29 mainline?
24. Interstate median ditch designed as a V. Recommend flat bottom ditch to facilitate ease of maintenance.
25. Station 51+00 to 68+00 V ditch is being created on the outside to maintain road within the ROW. If room allows, build a standard ditch section.
26. Sheet 91 of the cross sections show 6:1 to meet clear zone requirements, however if a car leaves the ramp, as shown, the area from the end of the 6:1 allows for a potential for a severe accident. This is a safety concern. There will be an approximate 200' vertical fall if a car leaves the ramp at Station 138+00? Does barrier need to be extended or provided?
27. **Consider any FAA restrictions for height of roadway lighting and height of cranes during construction.**
28. **During construction of the 12th Street interchange and I-29 mainline, consider maintaining NS I-29 traffic on the existing ramps or on the newly graded ramps while building new mainline and mainline structures over 12th.** This to be done concurrently with work on 12th east and west of the interchange. After the new mainline and mainline structures are completed finish work to construct 12th Street and ramps. **Will this allow a fifteen-month project instead of 24 month?**
29. Fire, ambulance and emergency service needs must be considered during development of construction sequences.

30. Pedestrian crossing EB and WB at Madison interchange. North side vs. south side of Madison. How will Madison be developed to the east? Where will future signals be installed? City currently considering traffic signal at Louise. How will peds be accommodated if they want to cross SB at Lyons? Will this cause a need for a traffic signal at Lyons? Quarry will probably dictate pedestrians cross on the north side of the Madison Street interchange.
31. Sheet 9, I -29 Mainline Typical Section shows a 45' dimension from inside of 12' lane to center of median bridge column. If the column is wide enough, this will decrease the allowable clear zone and guardrail would be necessary. What is the width of the bridge column going to be and how will this effect the attainable clear zone.
32. Sheet 11, water will drain from the ramp down onto the existing access road on quarry property. How will this be mitigated? It appears that snow will also pile on to the **existing** private access road more than it currently does. Should contact owner to discuss extent of concern. Freeze thaw cycles could make snow pack turn to ice and be a safety issue for haul vehicles.
33. Ramp C barrier will cause snowdrift onto I-29 southbound next to MSE retaining wall W2. Need to consider alternate designs to limit snowdrift.
34. Accommodate Fire hydrants and other street furniture so that ADA sidewalk requirements are met and so that these items are not a safety concern.
35. Check all radii to accommodate truck-turning movements with the appropriate truck design.